CLAIMS

WHAT IS CLAIMED:

1. A method comprising:

forming a first dielectric layer above a first structure layer;

forming a first opening in the first dielectric layer;

forming a first copper layer above the first dielectric layer and in the first opening; and

measuring an actual thickness of the copper layer;

comparing the actual thickness to a desired thickness; and

varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness.

2. The method of claim 1, wherein forming the first dielectric layer comprises forming the first dielectric layer using a dielectric material having a dielectric constant K of at most about four, and forming the first dielectric layer using at least one of a chemical vapor deposition (CVD) process, a low-pressure CVD (LPCVD) process, a plasma-enhanced CVD (PECVD) process, a sputtering process, a physical vapor deposition (PVD) process, and a spin-on coating process.

3. The method of claim 1, wherein forming the first opening in the first dielectric layer comprises forming the first opening in the first dielectric layer using one of a mask of photoresist and an etch stop layer, the one of the mask of photoresist and the etch stop layer being formed and patterned above the first dielectric layer.

4. The method of claim 3, wherein using the one of the mask of photoresist and the etch stop layer comprises using the etch stop layer being formed of silicon nitride.

5. The method of claim 1, wherein forming the copper layer comprises forming the copper layer using electrochemical deposition of copper.

6. The method of claim 5, wherein using the electrochemical deposition of the copper comprises forming at least one barrier layer and a copper seed layer in the first opening before the electrochemical deposition of the copper.

7. The method of claim 1, wherein measuring the actual thickness of the copper layer further comprises measuring the actual thickness of the copper layer at a plurality of locations.

8. The method of claim 7, wherein measuring the actual thickness of the copper layer at a plurality of locations further comprises averaging the plurality of measurements of the actual thickness.

9. The method of claim 7, wherein measuring the actual thickness of the copper layer at a plurality of locations further comprises selecting a median measurement as the actual thickness.

10. The method of claim 7, wherein comparing the actual thickness to the desired thickness further comprises comparing the desired thickness to each of the plurality of measured thickness.

11. The method of claim 8, wherein comparing the actual thickness to the desired thickness further comprises comparing the desired thickness to the averaged measured thickness.

12. The method of claim 9, wherein comparing the actual thickness to the desired thickness further comprises comparing the desired thickness to the median thickness.

13. The method of claim 1, wherein forming the first copper layer further comprises electroplating the first copper layer above the first dielectric layer and in the first opening.

14. The method of claim 13, wherein varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness further comprises varying an amount of time that the first copper layer is electroplated above the first dielectric layer and in the first opening.

15. The method of claim 14, wherein varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness further comprises increasing the amount of time that the first copper layer is electroplated above the first dielectric layer and in the first opening in response to the desired thickness being greater than the actual thickness.

16. The method of claim 14, wherein varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness

further comprises decreasing the amount of time that the first copper layer is electroplated above the first dielectric layer and in the first opening in response to the desired thickness being less than the actual thickness.

17. The method of claim 13, wherein varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness further comprises varying at least one of a current and voltage applied to an anode while electroplating the layer of copper above the first dielectric layer and in the first opening.

18. The method of claim 17, wherein varying at least one of a current and voltage further comprises increasing at least one of the current and voltage while the first copper layer is electroplated above the first dielectric layer and in the first opening in response to the desired thickness being greater than the actual thickness.

19. The method of claim 17, wherein varying at least one of a current and voltage further comprises decreasing at least one of the current and voltage while the first copper layer is electroplated above the first dielectric layer and in the first opening in response to the desired thickness being less than the actual thickness.

20. The method of claim 17, wherein varying at least one of the current and voltage further comprises varying the frequency of at least one of the current and voltage.

21. The method of claim 17, wherein varying at least one of the current and voltage further comprises varying the magnitude of at least one of the current and voltage.

22. A system, comprising:

means for forming a first dielectric layer above a first structure layer;

means for forming a first opening in the first dielectric layer;

means for forming a first copper layer above the first dielectric layer and in the first opening;

means for measuring an actual thickness of the copper layer;

means for comparing the actual thickness to a desired thickness; and

means for varying at least one parameter used to form the first copper layer in response to the actual thickness differing from the desired thickness.

23. A system, comprising:

an electroplate tool capable of depositing a layer of copper above a surface of a semiconductor device, said electroplate tool having at least one parameter that may be varied to control a thickness of the layer of copper;

a metrology tool capable of measuring the thickness of the copper layer and delivering a signal indicative thereof; and

a controller adapted for receiving the signal, comparing the measured thickness to a desired thickness, and varying the at least one parameter in response to the measured thickness differing from the desired thickness.

24. The system of claim 23, wherein the controller varying the at least one parameter further comprises the controller varying an amount of time that the first copper layer is electroplated above the surface of the semiconductor device.

25. The system of claim 24, wherein the controller further comprises the controller being adapted for increasing the amount of time that the first copper layer is electroplated above the surface of the semiconductor device in response to the desired thickness being greater than the actual thickness.

26. The system of claim 24, wherein the controller further comprises the controller being adapted for decreasing the amount of time that the first copper layer is electroplated above the surface of the semiconductor device in response to the desired thickness being less than the actual thickness.

27. The system of claim 23, wherein the controller further comprises the controller being adapted for varying at least one of a current and voltage applied to an anode of the electroplate tool while electroplating the layer of copper above the surface of the semiconductor device.

28. The system of claim 27, wherein the controller further comprises the controller being adapted for increasing at least one of the current and voltage while the first copper layer is electroplated above the surface of the semiconductor device in response to the desired thickness being greater than the actual thickness.

29. The system of claim 27, wherein the controller comprises the controller being adapted for decreasing at least one of the current and voltage while the first copper layer is electroplated above the surface of the semiconductor device in response to the desired thickness being less than the actual thickness.

30. The system of claim 27, wherein the controller further comprises the controller being adapted for varying the frequency of at least one of the current and voltage.

31. The system of claim 27, wherein the controller further comprises the controller being adapted for varying the magnitude of at least one of the current and voltage.